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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/662,536	09/15/2003	Jean Joseph Botti	DP-300006	2268

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DELPHI TECHNOLOGIES, INC.
M/C 480-410-202
PO BOX 5052
TROY, MI 48007

EXAMINER	
FISCHMANN, BRYAN R	

ART UNIT	PAPER NUMBER
3618	

DATE MAILED: 11/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/662,536	BOTTI ET AL.
	Examiner	Art Unit
	Bryan Fischmann	3618

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 September 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-25* is/are pending in the application.

4a) Of the above claim(s) *18-25* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,7,8,10-13,15 and 16* is/are rejected.

7)☒ Claim(s) *5,6,9,14 and 17* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 September 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Acknowledgments

1. The Election (paper 4) filed 09-13-2004 has been entered.

Election

2. The restriction requirement dated 08-11-2004 required an election between three species. In response (as acknowledged above), Applicant elected to prosecute Species II, Subspecies I (Figures 1, 3 and 5). Applicant identified all claims (1-25) as reading on the elected species.

The Examiner disagrees that claim 18 "reads" on the elected species, as claim 18 is drawn toward a free piston gas generator, which is associated with non-elected Species I. Due to this, claim 18 is withdrawn from consideration.

Note that claims 19-21 are also withdrawn from consideration, as they depend from claim 18.

The Examiner also disagrees that claim 22 reads on the elected species, as claim 22 is drawn toward a turbo-generator system, which is associated with non-elected Species III. Due to this, claim 22 is withdrawn from consideration.

Note that claims 23-25 are also withdrawn from consideration, as they depend from claim 22.

Accordingly, in summary, claims 18-25 are withdrawn from consideration, as being drawn toward a non-elected species. Applicant is requested to either cancel the withdrawn claims, or, when applicable, to make the claims dependable, if not already, upon an allowable generic claim.

3. Regarding the above election, because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

4. An action on the merits of elected Species II, Subspecies I, claims 1-17 follows.

Specification

5. The abstract of the disclosure is objected to because of the following:

A) It is requested that Applicant identify the meaning of the abbreviation "SOFC" recited in the abstract.

6. The disclosure is objected to because of the following:

A) It is requested that Applicant update Patent Application 09/294,679 listed on line 6 of page 1 to indicate this application is now US Patent 6609582. This also applies to the patent application listed on line 26 of page 6.

Also, it is noted that the Applicant has identified parent application 10/387,663 on line 3 of page 1. At the time of writing of this Office Action, this application is still under prosecution. If prosecution is completed during prosecution of this application, it is requested that Applicant also update the status of this parent application.

B) The following recited phrases are unclear, awkwardly worded, and/or grammatically incorrect:

1) To be grammatically correct, it is believed that the word "there" recited on line 8 of page 1 should instead be the word "their".

2) It is requested that Applicant identify the abbreviation "DME" listed on line 2 of page 2.

3) Line 20 of page 3 recites "second portion of air". This leaves unclear to the reader what constitutes the "first portion of air", which does not appear to be identified in "surrounding text".

4) Line 1 of page 3, as well as page 4 and the upper portion of page 5 recite the abbreviation "SOFC". However, this abbreviation is not identified until the latter portion of page 5. To assist the reader, it is requested that the abbreviation SOFC be identified at the first occurrence of the abbreviation, as opposed to identifying the abbreviation on the latter portion of page 5.

5) Figures 2-6 disclose "alternate species" as disclosed beginning on page 10. However, in the description of these "alternative species", the Applicant has not made clear where the structure disclosed in Figures 2-6 is installed in Figure 1.

Regarding Figure 4, although Figure 4 shares common structure (57) with Figure 1, Figure 4 is described on page 11 as providing a "hydrogen rich exhaust" from reference number 410 on Figure 4. As best understood, this "hydrogen rich exhaust" would then be fed into the inlet of the fuel cell. However, Figure 4 shows that reference number 410 is directly upstream of reference number 57, which is also shown on Figure 1. However, comparison of Figures 1 and 4 show that reference number 57 is "downstream" of the fuel cell 40, which would mean that reference number 410 would also be "downstream" of the fuel cell, since Figure 4 shows no other components between reference numbers 57 and 410. This leaves unclear the purpose of producing

a hydrogen rich gas stream downstream of a fuel cell that is then fed only through a heat exchanger (57).

Note also, as best understood, that in some cases, namely Figures 2 and 4, the structure in these figures is believed to "replace" engine 30. While in other cases, namely Figures 3, 5 and 6, the structure in these figures is believed to be utilized with engine 30.

Note that this "understanding", relative to Figure 4, seems inconsistent with lines 1-3 of page 10 which recite "Figures 2, 3 and 4 show three embodiments for configuring the present system with an engine 30". As best understood, the structure of Figure 4 would be used in lieu of engine 30.

C) The following inconsistencies in nomenclature were noted:

1) Line 30 of page 7 and line 5 of page 9 recites "fast start-up reformer 10". Line 22 of page 8 recites "electrical source 10".

To avoid confusion to the reader, and to facilitate identifying components by nomenclature in the claims, it is requested Applicant use consistent nomenclature for the same reference number throughout the specification.

D) Lines 8-11 of page 10 incorporates SAE paper No. 98FL-486 by reference. The incorporation by reference of this SAE paper is objected to due to the following:

1) Section 608.01(p) of the MPEP recites "An Application for a patent when filed may incorporate 'essential material' by reference to (1) a U.S. patent, (2) a U.S. patent application publication, or (3) a pending U.S. application...".

2) SAE paper 98FL-486 is entitled "Homogenous Charge Compression Ignition with a Free Piston". Claims 10 and 11 claim a "homogenous charge compression ignition". Due to this, the material of the above SAE paper is considered "essential material" and therefore may not be incorporated by reference.

Drawings

7. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign not mentioned in the description: 121. Correction is required.

8. The drawings are objected to, as it is considered unclear how Figures 2-6 relate to Figure 1. Specifically, Figures 2-6 are best understood to be located within Figure 1, although it is not clear where on Figure 1 the structure of Figures 2-6 is located. As noted above, in some instances, the structure shown on Figures 2-6 is believed to replace engine 30, while in other instances, the structure shown on Figures 2-6 is believed to be used in "conjunction" with engine 30.

Also, regarding Figure 4, although Figure 4 shares common structure (57) with Figure 1, Figure 4 is described on page 11 as providing a "hydrogen rich exhaust" from reference number 410 on Figure 4. As best understood, this "hydrogen rich exhaust" would then be fed into the inlet of the fuel cell. However, Figure 4 shows that reference number 410 is directly upstream of reference number 57, which is also shown on Figure 1. However, comparison of Figures 1 and 4 show that reference number 57 is "downstream" of the fuel cell 40, which would mean that reference number 410 would

also be "downstream" of the fuel cell, since Figure 4 shows no other components between reference numbers 57 and 410. This leaves unclear the purpose of producing a hydrogen rich gas stream downstream of a fuel cell that is then fed only through a heat exchanger (57).

9. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the following must be shown or the feature canceled from the claim. No new matter should be entered.

Claims 10 and 11 - a rich homogenous charge compression ignition

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Objections

10. Claims 1-17 are objected to due to the following:

Claim 1 recites "...said extended rich mode engine configured to operate extremely rich of stoichiometric to produce a substantially continuous hydrogen rich exhaust.

The phrase "extremely rich of stoichiometric" in the above recitation is objected to due to the following:

The phrase "extremely rich of stoichiometric" implies an air/fuel mixture that is "well-beyond" the stoichiometric air/fuel mixture. However, the latter portion of the

above recitation recites "a...hydrogen rich exhaust". Note that any air/fuel mixture that is "richer" than stoichiometric will produce a hydrogen exhaust, including air fuel mixtures that are not "extremely rich". Due to this, the "first portion" of the above recitation is considered "contradictory" to the "second portion" and is therefore objected to.

Claim Rejections - 35 USC 112

11. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

12. Claims 10 and 11 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention due to the following:

A) Claim 10 recites "An extended rich mode internal combustion engine as in claim 7, further comprising a rich homogenous charge compression ignition". Claim 11 contains a similar recitation.

On page 10, the Applicant refers to SAE Paper No. 98FL-486 entitled "Homogenous Charge Compression Ignition with a Free Piston...". Due to this, Applicant appears to disclose details of a "homogenous charge compression ignition" in the above SAE paper, which was incorporated by reference.

As noted, a SAE paper cannot be incorporated by reference, if it contains "essential material" to the disclosure. It would appear that the SAE paper contains "essential material", since material relative to a homogenous charge compression ignition is being claimed.

Since the SAE paper cannot be incorporated by reference since it contains "essential material", the disclosure lacks adequate written description of a homogenous charge compression ignition.

13. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

14. Claims 10 and 11 are rejected under 35 U.S.C. 112, second paragraph, as failing to set forth the subject matter which applicants regard as their invention.

A) Since claims 10 and 11 rely on "essential material" from an SAE paper that is improperly incorporated by reference, since, as noted, this SAE paper contains "essential material", the structure and meaning of the term homogenous charge compression ignition is considered unclear.

B) Also regarding claim 11, note that claim 11 recites "...comprising an oxygen enrichment device, a rich homogenous charge compression ignition, an optional dilute cylinder system...and combinations thereof".

This recitation leaves unclear whether Applicant is claiming some, or all of the components listed above. Specifically, since all of the components above are already recited at the beginning of the above recitation, it is then considered unclear what is meant by "combinations thereof" at the end of the above recitation.

Claim Rejections - 35 USC 102

15. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless --
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

16. Claims 1, 7, 12 and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Hepburn, US Patent 5,727,385.

Hepburn teaches an extended rich mode engine having an intake and an exhaust, said extended rich mode engine configured to operate extremely rich of stoichiometric to produce a substantially continuous hydrogen rich engine exhaust (see last paragraph of column 5).

Regarding claim 15, note that the engine of Hepburn compresses the mixture before ignition.

17. Claims 1, 4, 7, 8, 10, 15 and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by Rae, US Patent 3,040,519.

Rae teaches an extended rich mode engine having an intake and an exhaust, said extended rich mode engine configured to operate extremely rich of stoichiometric to produce a substantially continuous hydrogen rich engine exhaust (see claim 6).

Regarding claim 4, 8 and 16, note that an oxidant, such as oxygen, in tank 14 is added to the compressor output to assist combustion at high altitudes.

Regarding claim 7, note that since the fuel is burned internally, as opposed to externally, such as in a steam turbine, that the engine of Rae is an "internal combustion engine".

Regarding claims 10 and 15, note that the fuel is burned as a result of compression, as opposed to being ignited with a spark plug. Also regarding claim 10, see the 112 rejections of claim 10 as set forth in this Office Action.

18. Claims 1, 7, 12 and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Houseman, US Patent 4,041,910.

Houseman teaches an extended rich mode engine having an intake and an exhaust, said extended rich mode engine configured to operate extremely rich of stoichiometric to produce a substantially continuous hydrogen rich engine exhaust (from cylinders 10 and 11).

Regarding claim 15, note that the engine of Houseman compresses the mixture before ignition.

Claim Rejections - 35 USC 103

19. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

20. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Houseman, US Patent 4,041,910, in view of Houseman, et al, US Patent 3,982,910.

Houseman ('1910) teaches that an engine is operated in a fuel rich condition of an air fuel ratio of 7-11 to 1 (lines 54 and 55 of column 3), as opposed to an "optimum" or "stoichiometric" air fuel ratio of 14.65 to 1 (lines 21-24 of column 3). Houseman fails to teach that the combined concentration of hydrogen and carbon monoxide is greater than about 30% of the engine exhaust (line between cylinders 10 and 11 and carburetor 24) running in the fuel rich condition.

However, Houseman ('2910) teaches a gas generator that generates a hydrogen rich exhaust (abstract) that is utilized in a lean engine (91 – Figure 8) that has a concentration of carbon monoxide and hydrogen, by volume, at an air fuel ratio of 7:1 of approximately 38% (Figure 3). A hydrogen and carbon monoxide exhaust concentration by volume of greater than 30% is advantageous in that the hydrogen rich exhaust concentration percentages of Houseman '2910 may be used as fuel in the lean cylinders of Houseman '1910 to promote fuel efficiency and reduce emissions.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize a hydrogen rich exhaust with the concentration of hydrogen and carbon monoxide in excess of 30% in the hydrogen rich exhaust of Houseman '1910, as taught by Houseman '2910.

Regarding claim 3, note that Houseman '1910 teaches the use of an air fuel ratio of as low as 6.5 to allow an even richer hydrogen exhaust (lines 51-58 of column 4). From Figure 3 of Houseman '2910, an air/fuel ratio of 6.5 corresponds to a combined concentration of hydrogen and carbon monoxide of 44%. Note also that the claim 19 recitation of "about 50%" implies a tolerance. The Examiner then refers to case law to

attempt to quantify this tolerance. Note that in a recent court decision, *In re Lance G. Peterson and Ioannis Vasitis* decided 1-8-2003 by the US Court of Appeals it was affirmed that a claim recitation of "about 14 percent chromium" is unpatentable over a prior art reference that teaches "12% chromium". From this, it is considered reasonable to assume that the "tolerance" may be quantified as: 12/14 = .86, or plus or minus 14% of the stated values preceded by the word "about". From this, we see that the (+ or -) "tolerance" on the claim 19 recitation of "about 50%" is 50% x .86 and 50% x 1.14. This results in the recitation of "about 50%" to mean from 43 to 57%. From this, it is seen that the combined concentration of hydrogen and carbon monoxide of an air/fuel ratio of 6.5 of Houseman '2910 of 44% is "greater" than the claim 19 recitation of "greater than about 50%", which is interpreted to mean, from case law, "greater than 43 to 57%".

21. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hepburn, US Patent 5,727,385.

Hepburn fails to explicitly state that there is an oxygen enrichment device in fluid communication with the engine intake.

However, takes Official Notice that oxygen enrichment devices, such an nitrous oxide are known to be utilized on engines to increase performance. The nitrous oxide directly provides additional oxygen molecules as well as permitting additional oxygen from the atmosphere to enter the engine intake, by cooling the charge, thereby increasing density.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize an oxygen enrichment device.

Double Patenting

22. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-17 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 17-33 of copending Application No. 10/387,663. Although the conflicting claims are not identical, they are not patentably distinct from each other because the identified claims of each application are essentially drawn to the same invention. Note that independent claim 17 of the '663 application is drawn toward a method of producing a hydrogen rich engine exhaust. Note that Instant claim 1 is drawn toward apparatus to produce a hydrogen rich engine exhaust. Further note that regarding the method of producing the hydrogen rich engine exhaust in claim 17 of the '663 application, it is the Examiner's position that it would have been obvious to one having ordinary skill in the art at the time the invention was made to include the claimed method of producing the hydrogen rich engine exhaust of claim 17 of the '663 application. Because Instant claim 1 discloses all the structure necessary to perform the claimed functions, one of ordinary skill in the

art would find the claimed method to be an obvious step in light of the disclosed structure. See MPEP §2112.02. See also *In re King*, 801 F2d 1324, 1326; 231 USPQ 136, 138 (Fed Cir 1986).

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Allowable Subject Matter

23. Claims 5, 6, 9, 14 and 17 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

24. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

A) Ouchi – teaches an internal combustion engine operating on a reformed gas

B) Peschka – teaches hydrogen in conjunction with an engine and fuel cell

C) Collier, Jr., et al – teaches a hydrogen and natural gas mixture for an engine

D) Fournier, et al – teaches a hydrogen rich exhaust gas (column 4)

E) Baumert, et al – teaches a fuel cell on a vehicle operating an electrical system

F) WO 02/49131 – teaches a fuel cell with an exhaust to an engine

G) Japanese Patent 2002-280007 – teaches an engine exhaust to a fuel cell

H) WO 02/090733 – teaches a vehicle with an engine and a fuel cell

25. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Bryan Fischmann whose telephone number is (703) 306-5955. The examiner can normally be reached on Monday through Friday from 9:00 to 5:30.

If attempts to reach the Examiner by telephone are unsuccessful, the examiner's supervisor, Chris Ellis, can be reached on (703) 308-2560. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1113, or by accessing the PAIR system.

11-8-4

BRYAN FISCHMANN
PRIMARY EXAMINER